DEPARTMENT OF COMMERCE

RADIO SERVICE BULLETIN

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ABBREVIATIONS.

The necessary corrections to the List of Radio Stations of the United States and to the International List of Radiotelegraph Stations, appearing in this bulletin under the heading "Alterations and corrections," are published after the stations affected in the following order:

Name =Name of station.
Loc =Geographical location. O=west longitude. N=north latitude. S=south latitude.
Call =Call letters assigned.
System =Radio system used and sparks per second.
Range =Normal range in nautical miles.
W. l. =Wave lengths assigned: Normal wave lengths in italics.
Service =Nature of service maintained.
PG=General public.
PR=Limited public.
RC=Radio compass station.
P=Private.
O=Government business exclusively.
Hours =Hours of operation:
N=Continuous service.
X=No regular hours.
m=a. m. (12 m=midday).
s=p. m. (12 s=midnight).
Rates =Ship or coast charges in cents: c.=cents. (The rates in the international list are given in francs and centimes.)
I. W. T. Co. =Independent Wireless Telegraph Co.
R. C. A. =Radio Corporation of America.
S. O. R. S. =Ship Owners' Radio Service.
C. w. =Continuous wave.
I. c. w. =Interrupted continuous wave.
V. t. =Vacuum tube.
FX =Fixed station.
U. S. L. =After operating company denotes that the change applies only to the List of Radio Stations of the United States.
Kc. =Kilocycles.

54295—23——1

NEW STATIONS.

Commercial land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wavelengths.	Service.	Hours.	Station controlled by—
Baltimore, Md.[1]	WEQ	731, 909	FX	X	Board of Fire Commissioners.
Candle, Alaska [2]	KGF	300, 550, 600	FX	X	Robinson & Greenberg.
Clearwater, Calif.[3]	KNR	3375, 4200, 5500	FX		Federal Telegraph Co.
Cleveland, Ohio	WTK	300, 600	PG		Inter-City Radio Telegraph Co.
Detroit, Mich.[4]	WWJ	300, 600, 750	FX	X	Evening News Association.
Hidden Inlet, Alaska [5]	KQL	300, 450, 600	PG	X	A. & P. Products Co.
Honolulu, Hawaii [6]	KOG	300, 550, 600	PG		Mutual Telephone Co.
Kukak Bay, Alaska [7]	KDN	300, 550, 600	FX	X	Hemrich Packing Co. (Walter Hemrich).
Mobile, Ala	WNN				Tropical Radio Telegraph Co.
Union Bay, Alaska [8]	KON	300, 450, 600, 1800	PG	X	A. & P. Products Co.

[1] Range, 150; system, composite v. t. telephone and telegraph; rates, none.
[2] Loc. (approximately) 0.161° 58′ 00″, N. 65° 55′ 00″; range, 25; system, U. S. Navy v. t. telephone and telegraph; rates, none.
[3] Loc. 0.118° 09′ 40″, N. 33° 53′ 45″; range, 1000; system, Federal arc; hours, 7 a. m.–11 p. m.
[4] Loc. 0.83° 15′ 00″, N. 42° 19′ 40″; range, 150; system, Western Electric v. t. telegraph; rates, none.
[5] Loc. 0.130° 20′ 02″, N. 54° 56′ 40″; range, 300; system, R. C. A., 1000; rates, ship service 6 cents per word.
[6] Loc. (approximately) 0.157° 37′ 30″, N. 21° 15′ 00″; range, 200; system, composite v. t. telegraph; hours, 7.30 a. m.–11 p. m.; rates, interisland, 15 cents per word, no minimum; interisland nightletter 24 words $1, 4 cents each additional word.
[7] Loc. (approximately) 0.155° 15′ 00″, N. 57° 15′ 00″; range, 150; system, composite, 1000; rates, none.
[8] Loc. 0.132° 11′ 38″, N. 55° 47′ 22″, range, 300; system, R. C. A., 1000; rates, ship service 6 cents per word, no minimum; cable count, station to station 6 cents per word, minimum 60 cents domestic count; station to station night letter, 60 cents for 50 words, 12 cents each additional 10 words; station to station night message, 5 cents per word, minimum 50 cents, domestic count.

Commercial ship stations, alphabetically by names of vessels.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Name of vessel.	Call signal.	Rates.	Service.	Hours.	Owner of vessel.	Station controlled by—
Chilore [1]	KFIW	8	PG	X	Guaranty Trust of New York (trustee).	R. C. A.
Clauseus [2]	KOQB	8	PG	X	Planet S. S. Corporation.	Do.
Empire	KFIR		PG	X	Sabine Towing Co.	Owner of vessel.
Facile [3]	KFHV		PR	X	Horace A Beale, jr.	
G. E. Roper	KFIP		PG	X		
Poinsettia	KFHW				M. H. Whittier Co.	

[1] W. l., 360, 600, 706.
[2] Range, 300; system, R. C. A., 480; w. l., 300, 450, 600.
[3] Range 25; system, composite v. t.; w. l., 146, 300, 600; communicates with such stations as may be necessary in emergency.

Commercial land and ship stations, alphabetically by call signals.

[b=ship station: c=land station.]

Call signal.	Name.		Call signal.	Name.	
KDN	Kukak Bay, Alaska	c	KON	Union Bay, Alaska	c
KFHV	Facile	b	KOQB	Clauseus	b
KFHW	Poinsettia	b	KNR	Clearwater, Calif.	c
KFIP	G. E. Roper	b	KQL	Hidden Inlet, Alaska	c
KFIR	Empire	b	WEQ	Baltimore, Md	c
KFIW	Chilore	b	WNN	Mobile, Ala	c
KGF	Candle, Alaska	c	WTK	Cleveland, Ohio	c
KOG	Honolulu, Hawaii	c	WWJ	Detroit, Mich	c

Broadcasting stations, alphabetically by names of cities.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922.]

City.	Call signal.	City.	Call signal.
Allentown, Pa	WSAN	Mayville, N. Dak	KFHU
Atlantic City, N. J	WHAR	Middleport, Ohio	WSAK
Dartmouth, Mass	WSAQ	Newark, N. J	WRAZ
Denver, Colo	KFLF	Pittsburg, Kans	KFIV
Fall River, Mass	WSAR	Providence, R. I	WSAD
Do	WTAB	Do	WTAG
Gloucester City, N. J	WRAX	Reading, Pa	WRAW
Grand Island, Nebr	KFJA	Rochester, N. Y	WABO
Greeley, Colo	KFKA	Saginaw, Mich	WABM
Hutchinson, Kans	KFHX	St. Petersburg, Fla	WSAG
Independence, Mo	KFIX	Steubenville, Ohio	WTAK
Juneau, Alaska	KFIU	Storrs, Conn	WABL
La Crosse, Wis	WABN	Trinidad, Colo	KFHY
Lancaster, Pa	WDBC	Washington, D. C	WCAP
Lihue, Hawaii	KFHS	Do	WRC
Los Gatos, Calif	KFHQ	Worcester, Mass	WABK
Louisburg, Kans	KFIL	Youngstown, Ohio	WDBF
Marshalltown, Iowa	KFJB		

Stations broadcasting market or weather reports, music, concerts, lectures, etc., alphabetically by call letters.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922.]

Call signal.	Station operated and controlled by—	Location of station.	Power (watts).	Wave length.	Frequency (kilocycles).
KFHQ	Curtis Bros. hardware store (Alfred E. Fowler).	Los Gatos, Calif	5	242	1240
KFHS	Clifford I. Dow	Lihue, Hawaii	30	275	1090
KFHU	M. G. Sateren	Mayville, N. Dak	50	261	1150
KFHX	Robert W. Nelson	Hutchinson, Kans	50	229	1310
KFHY	R. S. McEwan	Trinidad, Colo	50	242	1240
KFIL	Windisch Electric Farm Equipment Co	Louisburg, Kans	100	234	1280
KFIU	Alaska Electric Light & Power Co	Juneau, Alaska	10	226	1330
KFIV	V. H. Broyles	Pittsburg, Kans	20	240	1250
KFIX	Reorganized Church of Jesus Christ of Latter Day Saints.	Independence, Mo	500	240	1250
KFJA	Central Power Co	Grand Island, Nebr	100	244	1230
KFJB	Marshall Electrical Co	Marshalltown, Iowa	10	248	1210
KFKA	Colorado State Teachers' College	Greeley, Colo	50	248	1210
KFLF	National Education Service	Denver, Colo	10	268	1120
WABK	First Baptist Church	Worcester, Mass	10	252	1190
WABL	Connecticut Agricultural College	Storrs, Conn	100	283	1060
WABM	F. E. Doherty Automotive & Radio Supply Co.	Saginaw, Mich	100	254	1180
WABN	Waldo C. Grover	La Crosse, Wis	100	234	1280
WABO	Lake Avenue Baptist Church	Rochester, N. Y	20	252	1190
WCAP	Chesapeake & Potomac Telephone Co	Washington, D. C	500	469	640
WDBC	Kirk, Johnson & Co	Lancaster, Pa	50	258	1160
WDBF	Robert G. Phillips	Youngstown, Ohio	50	261	1150
WHAR	Paramount Radio & Electric Co. (W. H. A. Paulus).	Atlantic City, N. J	15	231	1300
WRAW	Avenue Radio Shop (Horace D. Good)	Reading, Pa	10	238	1260
WRAX	Flaxon's garage	Gloucester City, N. J	50	268	1120
WRAZ	Radio Shop of Newark (Herman Lubinsky)	Newark, N. J	50	233	1290
WRC	Radio Corporation of America	Washington, D. C			
WSAD	J. A. Foster Co	Providence, R. I	50	261	1150
WSAG	City of St. Petersburg (Loren V. Davis)	St. Petersburg, Fla	10	244	1230
WSAK	Foster Egner (Daily News, Pomeroy, Ohio)	Middleport, Ohio	70	258	1160
WSAN	Allentown Radio Club	Allentown, Pa	10	229	1310
WSAQ	Round Hill Radio Corporation	Dartmouth, Mass	100	280	1070
WSAR	Doughty & Welch Electrical Co	Fall River, Mass	10	254	1180
WTAB	Fall River Daily Herald Publishing Co	do	10	248	1210
WTAG	Kern Music Co	Providence, R. I	10	258	1160
WTAK	Swan-Bower Co	Steubenville, Ohio	20	268	1130

Government land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
Anacostia, D. C.[1]	NSF	800	RC	N	U. S. Navy.
Do	NOF	Variable	O	X	Do.
Anchorage, Alaska	WUP		O	X	U. S. Army.
Annapolis, Md	NZO	Variable	O	X	U. S. Navy.
Camp Grant, Ill.[2]	WUBB	900	O	X	U. S. Army.
Fire Island, N. Y.[3]	NAH	800	RC	N	U. S. Navy.
Fort Amador, Canal Zone.[4]	WUBE	400	O	X	U. S. Army.
Fort Bragg, N. C.[5]	WZG	1380	O		Do.
Fort Clark, Tex. (Brackettsville).[4]	WZB	674	O	X	Do.
Fort De Lesseps, Canal Zone.[4]	WUCG	400	O	X	Do.
Fort Leavenworth, Kans.[6]	WUD	952, 2855	O	X	Do.
Fort Mills, P. I.[7]	WUAG	600, 1240	O	X	Do.
Fort Randolph, Canal Zone.	WUCI	400	O	X	Do.
Fort Rodman, Mass.[8]	WUCN	600	O	X	Do.
Fort Sherman, Canal Zone.[4]	WUCH	400	O	X	Do.
Fort Williams, Me.[9]	WUCU	475, 525, 600, 825.	O	X	Do.
Key West, Fla.[10]	WUBV	800	O	X	Do.
Lakehurst, N. J.[11]	NEL	800	RC	N	U. S. Navy.
Maxwell, Ala.[12]	WYK	1500	O		U. S. Army.
North Head, Wash.[13]	NPE	600, 975, 2720, 4525, 6000.	O	N	U. S. Navy.
Pensacola, Fla.[14]	NAS	800	RC	N	Do.
Relief (light vessel)[15]	NACD				Bureau of Lighthouses.
Do.[15]	NADB				Do.

[1] Loc. 0.77° 00′ 56″, N. 38° 51′ 28″; range, 100; system, U. S. Navy, 1000.
[2] Range, 25; system, U. S. Army v. t.
[3] Loc. 0.73° 12′ 32″, N. 40° 38′ 07″; range, 100; system, U. S. Navy, 1000.
[4] Range, 25; system, U. S. Army v. t.
[5] Range, 300; system, Federal arc; hours, 7 a. m.–7 p. m.
[6] Loc. 0.94° 55′ 31″, N. 39° 21′ 00″; range, 1000; system, U. S. Army v. t.
[7] Loc. (approximately) 0.120° 34′ 00″ E., N. 14° 22′ 00″; range, 500; system, Telefunken.
[8] Range, 50; system, U. S. Army, 1000.
[9] Range, 25; system, U. S. Army, 1000.
[10] Loc. (approximately) 0.81° 48′ 00″, N. 24° 30′ 00″; range, 50; system, U. S. Army, 1000.
[11] Loc. 0.74° 20′ 13″, N. 40° 02′ 15″; range, 100; system, U. S. Navy, 1000.
[12] Rage, 250; system, U. S. Army v. t.; hours, 7 a. m.–7 p. m.
[13] Loc. 0.124° 04′ 31″, N. 48° 17′ 55″; range, 500; system, U. S. Navy.
[14] Loc. 0.87° 16′ 54″, N. 30° 20′ 46″; range, 100; system, U. S. Navy, 1000.
[15] The station is open to relaying public correspondence in emergencies; hours, first 15 minutes every hour between 8 a. m. and 9.15 p. m.

Government ship stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations published by the Berne bureau.]

Station.	Call signal.	Wave lengths.	Service.	Hours.	Station controlled by—
S. C. 103	NOGM		O	X	U. S. Navy.
S. C. 285	NOSM		O	X	Do.

Government land and ship stations, alphabetically by call signals.

[b—ship station; c—land station.]

Call signal.	Name of station.	Call signal.	Name of station.
NACD	Relief (light vessel)....c	WUBE	Fort Amador, Canal Zone....c
NADB	Relief (light vessel)....c	WUBV	Key West, Fla....c
NAH	Fire Island, N. Y....c	WUCG	Fort De Lesseps, Canal Zone....c
NAS	Pensacola, Fla....c	WUCH	Fort Sherman, Canal Zone....c
NEL	Lakehurst, N. J....c	WUCI	Fort Randolph, Canal Zone....c
NOF	Anacostia, D. C....c	WUCN	Fort Rodman, Mass....c
NOGM	S. C. 103....b	WUCU	Fort Williams, Me....c
NOSN	S. C. 285....b	WUD	Fort Leavenworth, Kans....c
NPE	North Head, Wash....c	WUP	Anchorage, Alaska....c
NSF	Anacostia, D. C....c	WYK	Maxwell, Ala....c
NZO	Annapolis, Md....c	WZB	Fort Clark, Tex. (Brackettsville)....c
WUAG	Fort Mills, P. I....c	WZG	Fort Bragg, N. C....c
WUBB	Camp Grant, Ill....c		

Special land stations, alphabetically by names of stations.

[Additions to the List of Radio Stations of the United States, edition of June 30, 1922.]

Station.	Call signal.	Wave lengths.	Station controlled by—
Belfast, Me	1XAO	1600-3000	Radio Corporation of America, 233 Broadway, New York, N. Y.
Do.	1XAP	1600-3000	Do.
Clifton, Ariz	6XBH	300-1000	Roy M. Potter.
Dartmouth, Mass	1XAN	300-600	Round Hills Radio Corp.
Fort Worth, Tex	5XAP	150-220	W. E. Branch, 900 W. Seventh Street.
Mayville, N. Dak	9XAS	25-220	M. G. Sateren.
Metuchen, N. J.	2XAY	250, 280	New York World (Edmund H. Hansen), World Building, New York, N. Y.
Pullman, Wash	7XW	150, 1500	State College of Washington.
Scranton, Pa	8XAX	220-1000	Radio Sales Corporation.
South Manchester, Conn	1XAM	150-220	John L. Reinartz, 871 Hartford Road.
Spirit Lake, Wash	7YR	150-220	Young Men's Christian Association, (Boy's Division).
University, Va	3XAM	150-375	University of Virginia Radio Club.
Wooster, Ohio	8YAH	150-220	College of Wooster.

Special land stations, grouped by districts.

Call signal.	District and station.	Call signal.	District and station.
	First district:	6XBH	Sixth district: Clifton, Ariz.
	South Manchester, Conn.		Seventh district:
1XAM	Dartmouth, Mass.	7XW	Pullman, Wash.
1XAN	Belfast, Me.	7YR	Spirit Lake, Wash.
1XAO	Do.		Eighth district:
1XAP	Second district: Metuchen, N. J.	8XAX	Scranton, Pa.
2XAY	Third district: University, Va.	8YAH	Wooster, Ohio.
3XAM	Fifth district: Fort Worth, Tex.	9XAS	Ninth district: Mayville, N. Dak.
5XAP			

ALTERATIONS AND CORRECTIONS.

COMMERCIAL LAND STATIONS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

ARROYO PARK CAMP, CALIF.—W. l., 1764.
BEAUMONT, TEX.—W. l., 300, *600*, 706.
BOLINAS, CALIF. (KET).—W. l., 13345.
BOSTON, MASS.—W. l., 300, *600*, 1800; rates, 10 cents per word.
CAMP 62, CALIF.—Read Big Creek (Camp 62), Calif.; w. l., 1764.
CAMP 63, CALIF.—Read Big Creek (Camp 63), Calif.; w. l., 1764.
CLEARWATER, CALIF. (KOK).—System, Federal arc and composite spark, 480; w. l., 300, *600*, 1800; service, PG.
DAVENPORT, IOWA.—W. l., 674.
DETROIT, MICH.—W. l., 300, *600*, 1621.
FRANKFORT, MICH.—W. l., 300, *600*, 1666; service, PG and FX; fixed service is with all Ford Motor Co. stations.
HILLSBORO, OREG. (KEK).—Loc. (approximately) 0.122° 59′ 00″, N. 45° 31′ 00″; range, 500; system, Federal arc and Federal spark, 1000; w. l., 300, *600*, 1800; rates, 10 cents per word.
JACKSON, OHIO.—W. l., 1831.
LAGUNA BELL CAMP, CALIF.—W. l., 1764.
LAHAINA, HAWAII.—Changed to Wailuku, Hawaii; loc. (approximately) 0.156° 30′ 00″, N. 20° 55′ 00″; range, 200; system, composite v. t. telegraph.
LAWRENCEVILLE, ILL.—W. l., 1790.
LOS ANGELES, CALIF. (KHI).—W. l., 300, *600*, 1764.
MARTINSVILLE, ILL.—W. l., 1689.
MIAMI, FLA.—W. l., 300, 450, *600*, 706, 1599; rates, between Miami and all points in British Honduras, 36 cents; all points in Nicaragua, 45 cents; Almirante, Panama, 56 cents; all points in Costa Rica, 40 cents; Swan Island, 25 cents; all points in Republic of Honduras, 45 cents; Nassau, Bahama Islands, 25 cents; Bimini, Bahama Islands, 12 cents; Harbor Island, Bahama Islands, 31 cents; Governors Harbor, Bahama Islands, 31 cents; St. Martins, Danish West Indies, 38 cents; the rate given is per word, no minimum.
MINNEAPOLIS, MINN.—W. l., 1764.
NEW LONDON, CONN. (WLC).—W. l., 300, *600*.
NEW YORK, N. Y. (WNY).—W. l., add 2000, fixed service with Chatham.
NORTHVILLE, MICH.—W. l., 1909.
POINT REYES, CALIF. (Bolinas).—W. l., 13100.
SAN GABRIEL CAMP, CALIF.—W. l., 1764.
SPRINGFIELD, OHIO.—W. l., 1875.
TAMPA, FLA.—W. l., add 450.
TENAKEE, ALASKA.—Service, PR; communicates with certain land stations and ships in vicinity.
TULSA, OKLA.—W. l., 1599.

COMMERCIAL SHIP STATIONS ALPHABETICALLY BY NAMES OF VESSELS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

ABRON.—W. l., add 706.
ADLER.—Range, 100; system, Canadian Marconi, 240; rates, 8 cents per word; station operated and controlled by owner of vessel.
ADMIRAL GOODRICH.—W. l., 300, 450, *600*.
ADMIRAL SCHLEY.—W. l., 300, 450, *600*, 706.
ADVANCE.—W. l., add 706.
AGNES DOLLAR.—W. l., add. 706; station operated and controlled by R. C. A.
ALAMEDA (KOBN).—System, R. C. A., 1000; w. l., 300, 450, *600*, 706.
ALAMEDA (WAA).—W. l., add 706.
ALDEN ANDERSON.—W. l., add 706.
APACHE.—W. l., add 706.
ASTRAL.—System, R. C. A., 1000.
BELFAST.—W. l., add 706.
BETTERTON.—Range, 300; system, Navy-R. C. A., 1000; w. l., 300, 450, *600*; station operated and controlled by I. W. T. Co.

BOHEMIAN CLUB.—System, Federal arc, 1000 with chopper.
BOWDOIN.—Call signal changed to WNP; range, 100; system, composite v. t. telephone and telegraph; w. l., 220, 300, *600*, 750; service, PR; hours, X. This station is to be used for communicating with amateur, ship, and Government stations.
BRAMMELL POINT.—Name changed to Los Alamos; General Petroleum Co. owner of vessel.
BUFORD.—Fred Linderman owner of vessel.
CALVIN AUSTIN.—W. l., add 706.
CAMDEN (KDKL).—W. l., add 1800.
CAMDEN (KRC).—W. l., add 706.
CAPE ANN.—Range, 200; system, Navy-Lowenstein, 1000; w. l., 300, 450, *600*, 706; Cape S. S. Co. owner of vessel.
CAPE COD.—Cape S. S. Co. owner of vessel; station operated and controlled by R. C. A. (U. S. L.)
CAPE MAY.—W. l., add 706.
CAPTAIN A. F. LUCAS.—W. l., add 706.
CARACAS.—System, R. C. A., 1000.
CARIB (KJIU).—New York & Porto Rico S. S. Co. owner of vessel.
CARL D. BRADLEY.—W. l., 300, *600*, 706, 909; service, PS and PR; PR service is Rogers City, Mich., and the vessel Seeandbee.
CARRILLO.—W. l., add 706.
CASTANA.—Range, 300; system, Navy-R. C. A., 1000; w. l., 300, 450, *600*, 706; station operated and controlled by I. W. T. Co.
CATHWOOD.—Station operated and controlled by owner of vessel.
CAYO MAMBI.—W. l., add 706.
CHINCHA.—W. l., add 706; Planet S. S. Line owner of vessel.
CIRCINUS.—System, R. C. A., 1000; w. l., 300, 450, *600*, 700; Planet S. S. Corporation owner of vessel.
CITY OF BANGOR.—W. l., add 706.
CITY OF COLUMBUS.—W. l., add 706.
CITY OF MIAMI.—Name changed to E. G. Crosby; Crosby Transportation Co. owner of vessel.
CITY OF MONTGOMERY.—W. l., add 706.
CITY OF ROCKLAND.—W. l., add 706.
CITY OF ROME.—W. l., add 706.
COMAL.—W. l., add 706.
COMUS.—System, R. C. A., 1000; w. l., 300, *600*, 706.
CORDOVA.—W. l., add 706.
CORSAIR.—W. l., add 706.
CREOLE.—W. l., add 706.
DELECTO.—W. l., add 706.
EASTERN CROWN.—Hours, X.
EASTERN KNIGHT.—Columbian Pacific Shipping Co., owner of vessel.
EAST SIDE.—W. l., add 706.
EFENA.—W. l., 300, 450, *600*, 706.
EGERIA.—Name changed to Bert E. Haney.
EL ALBA.—W. l., add 706.
EL MUNDO.—W. l., add 706.
EL OCCIDENTE.—W. l., add 706.
EL RIO.—W. l., add 706.
EL SIGLO.—W. l., 300, *600*.
EVERETT.—W. l., add 706.
FINLAND.—W. l., add 706.
FOREST KING.—W. l., add 706.
FRANCIS E. POWELL.—Range, 300; system, R. C. A., 1000; w. l., 300, 450, *600*; Atlantic Refining Co., owner of vessel; station operated and controlled by R. C. A.
GEO. H. JONES.—W. l., 300, 450, *600*; system, R. C. A., 1000.
GOVERNOR DINGLEY.—System, R. C. A., 1000; W. l., 300, 450, *600*, 706.
GRIFFDU.—W. l., add 706.
GULFKING.—W. l., 300, 450, *600*, 706.
GULFMAID.—Station operated and controlled by I. W. T. Co.
GULF OF MEXICO.—Station operated and controlled by I. W. T. Co.
GULF QUEEN.—W. l., add 706.
GULFSTAR.—W. l., add 706.
GULFTRADE.—W. l., add 706.
HADNOT.—Station operated and controlled by R. C. A.
HAGAN.—W. l., 300, 450, *600*.

HABATONKA.—Name changed to Gulfpoint; W. l., add 706; station operated and controlled by I. W. T. Co.
HALWAY.—W. l., 300, *600*, 706, 1800; station operated and controlled by I. W. T. Co.
HAMILTON.—W. l., add 706.
HELEN.—W. l., add 706.
HOG ISLAND.—W. l., add 706.
HOLLYWOOD.—W. l., 300, 450, *600*, 706.
HOWARD.—Range, 150; system, R. C. A., 1000; W. l., add 706.
H. T. HARPER—W. l., add 706.
IMLAY.—Malstron Co., owner of vessel.
IOWAN.—W. l., add 706.
JAVA ARROW.—W. l., 300, 450, *600*.
J. M. DANZIGER.—System, R. C. A., 1000.
JOLEE.—W. l., add 706.
JUNIATA (KQJ).—System, R. C. A., 1000.
JUVIGNY.—Station operated and controlled by R. C. A.
KENTUCKIAN.—W. l., add 706.
LAKE CAYUGA.—Frank Paramino, owner of vessel.
LAKE FANNIN.—Name changed to Osage.
LAKE FILBERT.—W. l., add 706; Alaska S. S. Co., owner of vessel; station operated and controlled by owner of vessel.
LIBERTY MINQUAS.—American Petroleum Co., owner of vessel; station operated and controlled by R. C. A.
LIMON.—W. l., add 706.
LUBRICO.—Standard Oil Co. of California, owner of vessel.
MAHUKONA.—W. l., add 706.
MANCHURIA.—W. l., add 706.
MANOA (WMQ).—W. l., add 706.
MARAÇAIBO.—System, R. C. A., 1000; w. l., add 706.
MATSONIA.—W. l., add 706.
MENOMINEE.—System, Navy-Simon, 1000.
METAPAN.—W. l., add 706.
METEOR.—W. l., add 706.
MEVANIA.—System, Federal arc, 1000 with chopper; w. l., add 706; Malstron Co., owner of vessel; station operated and controlled by I. W. T. Co.
MILLER COUNTY.—System, Navy-R. C. A., 1000; w. l., 300, *600*, 706; Sun Shipbuilding & Dry Dock Co., owner of vessel; station operated and controlled by R. C. A.
MILLINOCKET.—W. l., add 706.
MISKIANZA.—W. l., 300, 450, *600*.
MOMUS.—W. l., add 706.
MOUNT BAKER.—Range, 200; system, Gray & Danielson, 240.
MOUNT CLINTON.—W. l., add 706.
MUNMOTOR.—W. l., add 706.
NEW JERSEY.—W. l., 300, 450, *600*.
NORTHLAND (KJD).—W. l., add 706.
NORTHWESTERN.—W. l., 300, *600*, 706.
OREGONIAN.—W. l., add 706.
OZAMA.—New York & Porto Rico S. S. Co., owner of vessel.
PACIFIC.—W. l., add 706.
PANAMA.—W. l., add 706.
PARAISO.—Name changed to Florence Olson; Oliver J. Olson & Co., owner of vessel.
PAULSBORO.—System, R. C. A., 1000.
PEARL SHELL.—W. l., 300, 450, *600*, 706.
PENNSYLVANIA SUN.—Range, 300; system, R. C. A., 1000; w. l., 300, *600*.
PLYMOUTH (KND).—W. l., add 706.
PRESIDENT ADAMS.—W. l., add 706.
PRESIDENT ARTHUR.—W. l., add 706.
PRESIDENT GARFIELD.—W. l., add 706.
PRESIDENT JEFFERSON.—W. l., add 706.
QUABBIN.—Name changed to Cape Cod; Cape Cod S. S. Co., owner of vessel.
QUAKER CITY.—W. l., add 706.
RICHMOND (WTR).—W. l., 300, 450, *600*, 706.
ROCKAWAY PARK.—W. l., add 706.
ROMAGNE.—Station operated and controlled by R. C. A.
SAGADAHOC.—W. l., add 706.
SALEM COUNTY.—Galena Navigation Co., owner of vessel; station operated and controlled by R. C. A.

SAN LORENZO.—System, R. C. A., 1000.
SANTA ANA (WAL).—Range, 200; hours, X.
SANTA ELISA.—W. l., add 706.
SANTA MALTA.—W. l., add 706.
SAPULPA.—Name changed to Cape Ann; station operated and controlled by R. C. A.
SAUCON.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., 300, 450, *600*, 706.
SCHENECTADY.—W. l., add 706; station operated and controlled by R. C. A. (U. S. L.).
SCHOHARIE.—W. l., add 706.
SRINER.—Range, 300; system, R. C. A., 1000; w. l., 300, 450, *600*.
SIALIA.—W. l., 300, *600*, 706, 909, 1713; service PG and PR; PR service is with all Ford Motor Co. stations.
SOCONY.—Standard Transportation Co. owner of vessel.
SOCONY 83.—Range, 150; system, R. C. A., 1000; w. l., 300, *600*, 706.
SOUTHLANDS.—W. l., add 706.
STEEL ENGINEER.—System, R. C. A., 1000.
STEEL EXPORTER.—System, R. C. A., 1000; w. l., add 706.
STEEL VOYAGER.—W. l., add 706.
STEEL WORKER.—W. l., 300, 450, *600*, 706.
SUCUBACO.—Rates, 8 cents per word; station operated and controlled by R. C. A.
SUEDCO.—Station operated and controlled by R. C. A. (U. S. L.).
SUELCO.—Station operated and controlled by R. C. A. (U. S. L.).
SULANIERCO.—Rates, 8 cents per word; station operated and controlled by R. C. A.
SUMANCO.—Rates, 8 cents per word; station operated and controlled by R. C. A.
SUNEWARKCO.—Rates, 8 cents per word; station operated and controlled by R. C. A.
SUNEWCO.—System, Navy-Wireless Specialty Apparatus Co., 1000; w. l., add 706.
SUPORTCO.—Station operated and controlled by R. C. A.
SURAILCO.—Rates, 8 cents per word; station operated and controlled by R. C. A.
SUTERMCO.—Rates, 8 cents per word; station operated and controlled by R. C. A.
THOMAS CROWLEY.—Thomas Crowley owner of vessel.
UNITED STATES.—Peninsular & Northern Navigation Co. owner of vessel; hours, X.
VESTA.—System, R. C. A., 1000.
VICTORIA.—W. l., 300, *600*, 706.
VITTORIO EMMANUELE III.—W. l., add 706.
WAIMEA.—Range, 150; system, R. C. A., 1000; w. l., 300, 450, *600*, 706; service, PG; hours, N.
WELLINGTON.—Brooks-Scanlon Corp. owner of vessel.
WEST CADRON.—Station operated and controlled by I. W. T. Co.
WEST ELDARA.—W. l., add 706.
WEST HAVRN.—W. l., add 706.
WEST IRMO.—W. l., add 706.
WEST JESTER.—W. l., add 706.
W. S. MILLER.—W. l., add 706.
ZAREMBO.—W. l., add 706.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

KDCB, *read* Cape Ann; KDCJ, *read* Bert E. Haney; KDTQ, *change to* WNP; KECN, *read* Osage; KHL, *read* Wailuku, Hawaii; KRO, *read* Los Alamos; KRY, *read* Big Creek (Camp 63), Calif.; KUJZ, *read* Cape Cod; KUPF, *read* Gulfpoint; KVP, *read* Big Creek (Camp 62), Calif.; WDI, *read* E. G. Crosby; and WRI, *read* Florence Olsou.

BROADCASTING STATIONS, BY CALL SIGNALS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1922.]

KDZQ (Denver, Colo.).—Station operated and controlled by Nichols Academy of Music.
KFAR (Hollywood, Calif.).—W. l., 280; frequency, kc. 1070.
KFDD (Boise, Idaho).—W. l., 252; frequency, kc. 1190.
KFEY (Kellogg, Idaho).—Station operated and controlled by Bunker Hill & Sullivan Mining & Concentrating Co.
KFFB (Boise, Idaho).—W. l., 240; frequency, kc. 1250.
KFFO (Hillsboro, Oreg.).—W. l., 229; frequency, kc. 1310.
KLN (Monterey, Calif.).—W. l., 261; frequency, kc. 1150.

KRE (Berkeley, Calif.).—W. l., 278; frequency, kc. 1080.
KZV (Wenatchee, Wash.).—W. l., 360 only.
WAAN (Columbia, Mo.).—W. l., 254; frequency, kc. 1180.
WABO (Rochester, N. Y.).—W. l., 252; frequency, kc. 1190.
WBT (Charlotte, N. C.).—W. l., 360 only.
WCAD (Canton, N. Y.).—W. l., 280; frequency, kc. 1070.
WCAG (New Orleans, La.).—W. l., 268; frequency, kc. 1120; station operated and controlled by Clyde R. Randall.
WCBD (Zion, Ill.).—W. l., 345; frequency, kc. 870.
WDAE (Tampa, Fla.).—W. l., 360 only.
WDAI (Syracuse, N. Y.).—W. l., 246; frequency, kc. 1220; station operated and controlled by Hughes Radio Corp.
WDAL (Jacksonville, Fla.).—W. l., 360 only.
WDAP (Chicago, Ill.).—W. l., 360 only; station operated and controlled by Board of Trade.
WDT (Stapleton, N. Y.).—W. l., 405; frequency, kc. 740.
WEAA (Flint, Mich.).—W. l., 280; frequency, kc. 1070.
WEAN (Providence, R. I.).—W. l., 273; frequency, kc. 1100.
WEAO (Columbus, Ohio).—W. l., 360 only.
WEV (Houston, Tex.).—W. l., 360 only.
WEW (St. Louis, Mo.).—W. l., 261; frequency, kc. 1150.
WHAD (Milwaukee, Wis.).—W. l., 280; frequency, kc. 1070.
WIAB (Rockford, Ill.).—W. l., 252; frequency, kc. 1190.
WIAC (Galveston, Tex.).—W. l., 360 only.
WIAS (Burlington, Iowa).—Station operated and controlled by Home Electric Co.
WKAR (East Lansing, Mich.).—W. l., 280; frequency, kc. 1070.
WLAJ (Waco, Tex.).—W. l., 360 only.
WLB (Minneapolis, Minn.).—W. l., 360 only.
WLW (Cincinnati, Ohio.).—W. l., 309; frequency, kc. 970.
WMAK (Lockport, N. Y.).—W. l., 360 only.
WMAN (Columbus, Ohio).—W. l., 286; frequency, kc. 1050.
WMAT (Duluth, Minn.).—W. l., 266; frequency, kc. 1130.
WOAJ (Parsons, Kans.).—W. l., 258; frequency, kc. 1160.
WOAK (Frankfort, Ky.).—W. l., 240; frequency, kc. 1250.
WQAL (Mattoon, Ill.).—W. l., 258; frequency, kc. 1160.
WQAB (Springfield, Mo.).—W. l., 236; frequency, kc. 1270.
WQAE (Springfield, Vt.).—W. l., 275; frequency, kc. 1090.
WQAN (Scranton, Pa.).—W. l., 280; frequency, kc. 1070.
WQAT (Westhampton, Va.).—Changed to Richmond, Va.
WQAV (Greenville, S. C.).—W. l., 258; frequency, kc. 1160.
WQAW (Washington, D. C.).—W. l., 236; frequency, kc. 1270.
WSAT (Plainview, Tex.).—W. l., 268; frequency, kc. 1120.
WWB (Canton, Ohio).—W. l., 268; frequency, kc. 1120.
Strike out all particulars of the following-named stations: KDZG, San Francisco, Calif.; KDZX, San Francisco, Calif.; KFBD, Hanford, Calif.; KFBH, Marshfield, Oreg.; KFCB, Phoenix, Ariz.; KFEB, Taft, Calif.; KFGB, Pueblo, Colo.; KJJ, Sunnyvale, Calif.; KNI, Eureka, Calif.; KNN, Los Angeles, Calif.; KOA, Denver, Colo.; KSL, San Francisco, Calif.; WAAL, Minneapolis, Minn.; WAAY, Youngstown, Ohio; WCAB, Newburgh, N. Y.; WCAC, Fort Smith, Ark.; WCAW, Quincy, Ill.; WEAV, Rushville, Nebr.; WEAX, Little Rock, Ark.; WEH, Tulsa, Okla.; WEY, Wichita, Kans.; WFAC, Superior, Wis.; WFAW, Miami, Fla.; WFAZ, Charleston, S. C.; WGAM, Orangeburg, S. C.; WHAE, Sioux City, Iowa; WHAW, Tampa, Fla.; WIAE, Vinton, Iowa; WKAH, West Palm Beach, Fla.; WKAK, Okemah, Okla.; WKAL, Orange, Tex.; WKN, Memphis, Tenn.; WLAS, Hutchinson, Kans.; WLK, Indianapolis, Ind.; WMAG, Liberal, Kans.; WMAR, Waterloo, Iowa; WOAU, Evansville, Ind.; WMAX, Ann Arbor, Mich.; WOU, Omaha, Nebr.; WPAA, Wahoo, Nebr.; WPE, Independence, Mo.; WPO, Memphis, Tenn.; WRAC, Mayville, N. Dak.; WRAK, Escanaba, Mich.; WRAM, Galesburg, Ill.; WSAV, Houston, Tex.; and WWAY, Chicago, Ill.

GOVERNMENT LAND STATIONS, ALPHABETICALLY BY NAMES OF STATIONS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations, published by the Berne bureau.]

AMAGANSETT, N. Y.—Loc. 0.72° 07′ 27″, N. 4° 58′ 10″.
ANNAPOLIS, MD. (NSS).—*Read*, Washington, D. C. (Annapolis, Md.); w. l., 17145 only.

BALBOA, CANAL ZONE.—W. l., strike out 10110, add 7000.
BAR HARBOR, ME. (Otter Cliffs, regular station).—300, *600*, 975, 2250, 2400.
BELLEFONTE, PA.—W. l., 3446, 3998.
BOLLING FIELD, D. C. (Anacostia).—Range, 250; system U. S. Army v. t.; w. l., 1500; hours, X.
BOSTON, MASS. (NAD).—W. l., strike out 1620, add 1363.
BOSTON, MASS. (WVO).—Range, 50; system, U. S. Army v. t.; w. l., 674.
BRYAN, OHIO.—W. l., 3295, 3998.
CAMP ALFRED VAIL, N. J.—Range, 300; system, Federal arc; w. l., 1090, 1500.
CAMP KNOX, KY.—Range, 200; system, U. S. Army, 1000; w. l., 975.
CAMP MARFA, TEX.—Range, 1000; system, U. S. Army, 1000; w. l., 3800.
CAMP NICHOLS, P. I. (Rizal Province).—Range, 250; system, U. S. Army, v. t.; w. l., 250, 1500; hours, X.
CAMP JOHN HAY, P. I.—*Read*, Fort John Hay, P. I.; range, 300; system, U. S. Army, 1000; w. l., *600*, 975, 1200, 1800.
CAMP STOTSENBURG, P. I. (WUCA).—Range, 300; system, U. S. Army, 1000; w. l., *600*, 952.
CAMP STOTSENBURG, P. I. (Clark Field, WYS).—*Read*, Clark Field, Camp Stotsenburg, P. I.; range, 25–150; system, U. S. Army v. t. and spark, 1000; w. l., 250, 450; hours, X.
CAVITE, P. I.—W. l., strike out 11500.
CHARLESTON, S. C.—W. l., strike out 2250, add 2600.
CHEYENNE, WYO.—W. l., 3123, 3998.
CHICAGO, ILL. (WVT).—Range, 250; system, U. S. Army, v. t.; w. l., 1364; hours, 7.30 a. m.–7.30 p. m., local time.
CIRCLE, ALASKA.—System, R. C. A., 1000.
CLEVELAND, OHIO (NRH).—W. l., 3795, 3998.
CLEVELAND, OHIO (WWO).—W. l., 3795, 3998.
COLON, CANAL ZONE.—W. l., strike out 2750, add 1620.
CORREGIDOR, P. I. (Kindley Field).—*Read*, Kindley Field, P. I. (Corregidor); range, 250; system, U. S. Army v. t.; w. l., 1500; hours, 7 a. m.–7 p. m., local time.
CRISTOBAL, CANAL ZONE (France Field).—*Read*, France Field, Canal Zone (Cristobal); range, 250; system, U. S. Army, v. t.; w. l., 1500; hours, 7 a. m.–7 p. m., local time.
DAHLGREN, VA.—W. l., 347, hours, X.
DEER ISLAND, MASS.—Loc. 0.70 57′ 29″, N. 42° 21′ 16″.
DOUGLAS, ARIZ.—*Read*, Camp Jones, Ariz. (Douglas); range, 50; w. l., 1091.
EAGLE HARBOR, MICH. (R. C.).—Loc. 0.85° 08′ 45″, N. 47° 27′ 49″; hours, N.
ELKO, NEV.—W. l., 3407, 3998.
EUREKA, CALIF. (regular station).—W. l., strike out 2650, add 2250.
FAIRFIELD, OHIO.—Range, 250; system, U. S. Army, v. t.; w. l., 1500; hours, 7 a. m.–7 p. m.
FORT ADAMS, R. I.—System, composite, 1000; w. l., 1150.
FORT ANDREWS, MASS.—Range, 200; system, composite, 1000; w. l., 1091.
FORT BARRANCAS, FLA.—Range, 200; system, R. C. A.; 1000; w. l., 1090.
FORT BENJAMIN HARRISON, IND.—Range, 250; system, U. S. Army, v. t.; w. l., 1559.
FORT BLISS, TEX.—System, U. S. Army arc; w. l., 3100; hours, X.
FORT CASEY, WASH.—W. l., 1000.
FORT CASWELL, N. C.—Range, 50; system, U. S. Army, 1000.
FORT CONSTITUTION, N. H.—Range, 50; w. l., 1300.
FORT CROCKETT, TEX.—Range, 50; system, U. S. Army, 1000; w. l., 1090.
FORT D. A. RUSSELL, WYO.—Range, 250; system, U. S. Army, v. t.; w. l., 1412; hours, X.
FORT DOUGLAS, UTAH.—Range, 250; system, U. S. Army, v. t.; w. l., 2725; hours, X.
FORT DRUM, P. I.—Range, 50; system, U. S. Army, 1000; w. l., 825.
FORT DU PONT, DEL.—Range, 50; w. l., 300, 825.
FORT ETHAN ALLEN, VT.—Range, 50; system, U. S. Army, v. t.; w. l., 1090; hours, X.
FORT FRANK, P. I.—System, U. S. Army, 1000; w. l., 500; hours, 8 a. m.–7 p. m.
FORT HANCOCK, N. J.—Range, 200; system, Telefunken, 1000; w. l., 1091.
FORT HAYES, OHIO (Columbus).—Range, 250; system, U. S. Army, v. t.; w. l., 1412; hours, X.
FORT H. G. WRIGHT, N. Y.—Range, 200; system, U. S. Army, v. t. and R. C. A., 1000; w. l., 1100.
FORT HOWARD, MD.—Range, 250; system, U. S. Army, v. t.; w. l., 1349; hours, 7.30 a. m.–7.30 p. m.
FORT HUACHUCA, ARIZ.—W. l., 1318; hours, X.
FORT LEVETT, ME.—Range, 200; system, Telefunken, 1000; w. l., 1300.
FORT MCARTHUR, TEX.—System, U. S. Army, 1000; w. l., 1304.

FORT MCPHERSON, GA.—Range, 500; system, U. S. Army, v. t.; w. l., 1319, 2552; hours, 7 a. m.–7 p. m.
FORT MILLS, P. I. (WVN).—Range, 500; system, Telefunken, 1000; w. l., 1240; hours, X.
FORT MONROE, VA.—Range, 200; system, U. S. Army, v. t. and R. C. A., 1000; w. l., 674.
FORT MORGAN, ALA.—System, U. S. Army, 1000; w. l., 1090.
FORT MOULTRIE, S. C.—W. l., 1090.
FORT OMAHA, NEBR.—Range, 250; system, U. S. Army, v. t.; w. l., 1334; hours, X.
FORT RILEY, KANS.—Range, 25; system, U. S. Army, v. t.; w. l., 1091.
FORT RINGGOLD, TEX.—W. l., 1091.
FORT ROSECRANS, CALIF.—Range, 200; system, Kilbourne & Clark, 1000; w. l., 1090.
FORT SAM HOUSTON, TEX.—Range, 2000; system, U. S. Army arc; w. l., 5200, hours, X.
FORT SAN JACINTO, TEX.—Range, 50; system, U. S. Army, 1000; w. l., 825.
FORT SCREVEN, GA.—Range, 50.
FORT SILL, OKLA.—Range, 1000; system, Federal arc; w. l., 1537.
FORT STEVENS, OREG. (WUK).—Range, 200; system, R. C. A., 1000; w. l., 1091.
FORT STOREY, VA.—Range, 50; w. l., 1100.
FORT TERRY, N. Y.—Range, 50; system, U. S. Army, 1100.
FORT TOTTEN, N. Y.—Range, 200; system, R. C. A., 1000; w. l., 1091; hours, X.
FORT TRAVIS, TEX.—W. l., 825.
FORT WASHINGTON, MD.—Range, 50; system, U. S. Army, 1000.
FORT WHITMAN, WASH.—Range, 300; w. l., 1091.
FORT WINFIELD SCOTT, CALIF.—Range, 300; w. l., 1091.
FORT WINT, P. I.—Range, 200; system, U. S. Army, 1000.
FORT WORDEN, WASH.—Range, 200; system, R. C. A., 1000; w. l., 1091.
GOVERNORS ISLAND, N. Y.—Range, 200; system, U. S. Army, v. t. and R. C. A., 1000; w. l., 1334; hours, 8 a. m.–8 p. m.
GREAT LAKES, ILL.—W. l., add 3400.
HEMPSTEAD, N. Y. (Hazelhurst Field).—W. l., 3407, 3998.
HOLY CROSS, ALASKA.—Range, 300; system, U. S. Army, v. t. telephone and telegraph and R. C. A., 1000; w. l., 450, 510, 525, 550.
HONOLULU, HAWAII (Pearl Harbor).—Service, PG; rates, 12 cents per word.
IOWA CITY, IOWA.—W. l., 3369, 3998.
JEFFERSON BARRACKS, MO.—Range, 250; system, U. S. Army v. t.; w. l., 1395.
JUPITER, FLA. (regular station).—W. l., strike out 1688, add 1305.
JUPITER, FLA. (R. C.).—Hours, N.
KELLY FIELD, TEX.—Range, 250; system, U. S. Army v. t.; w. l., 1500; hours, 7 a. m.–7 p. m.
KEY WEST, FLA. (regular station).—W. l., strike out 1988, add 1451.
LANGLEY FIELD, VA. (Hampton).—Range, 250; system, U. S. Army v. t.; w. l., 1500; hours, 7 a. m.–7 p. m.
LAKEHURST, N. J.—Loc. 0.74° 20′ 13″, N. 40° 02′ 15″.
LAREDO, TEX.—*Read* Fort McIntosh, Tex. (Laredo); range, 300–1000; system, U. S. Army arc and spark, 1000; w. l., 1364; hours, X.
LIVENGOOD, ALASKA.—Range, 300; system, Telefunken, 1000; w. l., 520; service, FX.
MANILA, P. I.—Range, 1000; system, U. S. Army, 1000.
MAYWOOD, ILL.—W. l., 3569, 3998.
MITCHELL FIELD, N. Y.—Range, 250; system, U. S. Army v. t.; w. l., 1500; hours, X.
MOUNDSVILLE, W. VA. (Langin Field).—*Read* Langin Field, W. Va. (Moundsville); range 300; system, Federal arc; w. l., 1500; hours, 7 a. m.–7 p. m.
NEW ORLEANS, LA.—W. l., strike out 1832; add 2600.
NEWPORT, R. I.—W. l., strike out 1908, add 2600.
NEW YORK, N. Y.—W. l., strike out 1832, add 1540.
NORFOLK, VA.—W. l., strike out 1851, add 1360.
NOGALES, ARIZ.—*Read* Camp S. D. Little, Ariz. (Nogales); range 50; w. l., 1091.
NORTH PLATTE, NEBR.—W. l., 3486, 3998.
OLONGAPO, P. I.—Service, O.
OMAHA, NEBR.—W. l., 3224, 3998.
PEARL HARBOR, HAWAII (Luke Field, Fords Island).—*Read* Luke Field, Hawaii (Pearl Harbor); range, 250; system, U. S. Army v. t.; w. l., 1500; hours, 7 a. m.–7 p. m.
PENSACOLA, FLA.—Loc. 0.87° 16′ 54″, N. 30° 20′ 46″; w. l., strike out 2250, add 1330.
PHILADELPHIA, PA.—W. l., strike out 1948, add 1300.
PORT EADS, LA.—Range, 200; system, Navy-Simon, 1000; hours, X.
PORTSMOUTH, N. H.—W. l., strike out 1813, add 1395.
PRICES NECK, R. I.—Loc. 0.71° 20′ 16″, N. 41° 27′ 04″.

RANTOUL, ILL. (Chanute Field).—*Read* Chanute Field, Ill. (Rantoul); range, 250; system, U. S. Army v. t.; w. l., 674, 1500; hours, 7 a. m.–7 p. m.
RENO, NEV.—W. l., 3784, 3998.
ROCK SPRINGS, WYO.—W. l., 3156, 3998.
ROCKWELL FIELD, CALIF. (Coronado).—Range, 250; system, U. S. Army v. t.; w. l., 1500; hours, 7 a. m.–7 p. m.
SALT LAKE CITY, UTAH.—W. l., 3258, 3998.
SAN DIEGO, CALIF.—W. l., strike out 10110, 11500, 17145.
SAN FRANCISCO, CALIF. (NPG).—W. l., strike out 1908, 7100, 7900, 8875, 13900, 17145, add 1330, 10500.
SAN FRANCISCO, CALIF. (Presidio of San Francisco WVY).—Range, 500; system, U. S. Army v. t.; w. l., 1349; hours, X.
SAN JUAN, P. R.—W. l., 8875, 9145, 10110.
SAN PEDRO, CALIF.—W. l., 150 only; service, O.
SAYVILLE, N. Y.—*Read* Washington, D. C. (Sayville, N. Y.); w. l., 10510 only.
SCOTT FIELD, ILL. (Belleville).—Range, 50; system, U. S. Army v. t.; w. l., 952; hours, 7 a. m.–7 p. m.
SEATTLE, WASH.—W. l., strike out 700, add 1988.
SELFRIDGE FIELD, MICH. (Mount Clemens).—Range, 250; system, U. S. Army v. t. w. l., 1500; hours, 7 a. m.–7 p. m.
SHANGHAI, CHINA.—Hours, X.
SMITH ISLAND, WASH.—Loc. 0.122 50′ 39″, N. 48 19′ 04″.
ST. AUGUSTINE, FLA.—W. l., strike out 1851, add 2100.
SURFSIDE, MASS.—Loc., 0.70 05′ 53″, N. 41 14′ 39″
TIENTSIN, CHINA.—Range 1000; hours, X
WASHINGTON, D. C. (WWX).—W. l. 3656, 3998.
WASHINGTON, D. C. (WXY).—W. l., variable; system, U. S. Army v. t.; w. l., 1338, 2998; hours, N.
WEST MEMPHIS, TENN.—W. l., 300, *600*, 700; hours, X.
WEST POINT, N. Y.—Range, 25; system, U. S. Army v. t.; w. l., 1091; hours, X
WHITEFISH POINT, MICH.—W. l., 800 only.

Strike out all particulars of the following-named stations: Alpena, Mich., Astoria, Oreg., Buffalo, N. Y., Cape May, N. J. (regular station), Cayey (El Cayey), P. R., Chicago, Ill. (NUR), Detroit, Mich., Duluth, Minn., Mackinac Island, Mich., Manistique, Mich., Milwaukee, Wis., Mobile, Ala., Port Arthur, Tex., and Thunder Bay Island, Mich.

NOTE.—The hours for all lighthouse ship stations are "first 15 minutes every hour between 8 a. m. and 9.15 p. m." The wave length of 3998 meters, which is assigned to certain stations above named of the Post Office Department, and the naval station at Cleveland (NRH) is used for "listening in."

GOVERNMENT SHIP STATIONS, ALPHABETICALLY BY NAMES OF VESSELS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1922, and to the International List of Radiotelegraph Stations, published by the Berne Bureau.]

B. M. HARROD.—W. l., 300, *600*, 700.
CAMBRAI.—Range, 300; system, Federal arc; w. l., 300, *600*, 952, 2120, 2550; hours; X.
CAPTAIN CHARLES W. ROWELL.—Range, 200; w. l., 300, *600*, 800, 952.
CAPTAIN CLARENCE M. CONDON.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
CAPT. EDWARD P. NONES.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
GENERAL E. O. C. ORD.—Range, 200; w. l., 300, *600*, 800, 952.
CAPTAIN FRED L. PERRY.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
COLONEL GEORGE ARMISTEAD.—Range, 200; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
COLONEL GEORGE F. E. HARRISON.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
CAPTAIN GREGORY BARRETT.—Range, 50; w. l., 300, *600*, 800, 952.
CAPTAIN JAMES FORNANCE.—Range, 50; w. l., 300, *600*, 800, 952.
CUBA.—Range, 200; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
DELLWOOD.—Range, 300; w. l., 300, *600*, 952, 2100, 2600.
GAMA.—W. l., 300, *600*, 700.
GENERAL ABSALOM BAIRD.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
GENERAL A. M. RANDALL.—Range, 50; w. l., 300, *600*, 800, 952.

GENERAL G. W. GETTY.—W. l., 300, *600*, 800, 952.
GENERAL J. FRANKLIN BELL.—Range, 50; system, U. S. Army, 1000; w. l. 300, *600*, 800, 952.
GENERAL J. M. BRANNA.—Range, 50; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
GENERAL JOHN M. SCHOFIELD.—Range, 200; w. l., 300, *600*, 952.
GENERAL MIFFLIN.—Range, 50; w. l., 300, *600*, 952.
GENERAL NATHANIEL GREENE.—Range, 50; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
GENERAL R. H. JACKSON.—Range, 200; w. l., 300, *600*, 800, 952.
GENERAL RICHARD ARNOLD.—Range, 50; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
GENERAL R. N. BATCHELDER.—Range, 50; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952; hours, X.
GENERAL ROBERT ANDERSON.—Range, 50; w. l., 300, *600*, 800, 952.
GENERAL ROYAL T. FRANK.—Range, 200; w. l., 300, *600*, 800, 1100.
GENERAL S. M. MILLS.—W. l., 300, *600*, 800, 1100.
GENERAL TIMOTHY PICKERING.—W. l., 300, *600*, 800, 952.
GENERAL WILLIAM M. GRAHAM.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
GRANT.—Range, 300; system, Federal arc; w. l., 300, *600*, 800, 975, 1200; hours, X.
HENRY FLAD.—W. l., 300, *600*, 700.
ILLINOIS (WYAX).—Range, 200; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
INSPECTOR.—Range, 200; w. l., 300, *600*, 700.
IOTA.—W. l., 300, *600*, 700.
JOSEPH HENRY.—Range, 200; w. l., 300, *600*, 952.
JUPITER.—Range, 200; w. l., 300, *600*, 700.
KAPTA.—W. l., 300, *600*, 700.
LT. COL. HERMAN C. SCHUMM.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
MAJOR ALBERT G. FORSE.—Range, 50; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
MAJOR ALBERT G. JENKINS.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
MAJOR EVAN THOMAS.—Range, 200; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
MAJOR WILLIAM P. PENCE.—Range, 150; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
MEIGS.—Range, 300; system, Federal arc; w. l., 300, *600*, 800, 975, 1200, 2400; hours, X.
MERRITT.—Range, 500; system, U. S. Army, 1000; w. l., 300, *600*, 952, 1200; service, O; hours, X.
NAVESINK.—Range, 200; w. l., 300, *600*, 952.
RENO.—Range, 200; w. l., 300, *600*, 800, 952.
SLOCUM.—Range, 200; system, U. S. Army, 1000; service, O; hours, X.
SOMME.—Range, 300; system, Federal arc; w. l., 300, *600*, 952, 2100, 2600; hours, X.
S. P. 521 (Isabel).—*Read* Isabel.
SPRIGG CARROLL.—Range, 50; system, U. S. Army, 1000; w. l., 300, *600*, 800, 952.
SAN PEDRO.—Range, 50; w. l., 300, *600*, 800, 952.
SATURN.—W. l., 300, *600*, 700.
THOMAS.—System, U. S. Army, 1000, and U. S. Navy, 1000; w. l., 300, *600*, 800, 975, 1200, 2400.

Strike out all particulars of the following-named vessels: Atlantic, Cadmus, E–1, E–2, Flamingo, Gorgona, Gwalia, Gypsum Prince, Lt. Col. Robert C. Gildart, Major Carl A. Lohr, Major John W. McKie, S. C. 100, Tacony, and Wilhelmina.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY BY CALL SIGNALS.

NDD, *read* Washington, D. C. (Sayville); NHF, *read* Isabel; NSS, *read* Washington, D. C. (Annapolis); WUH, *read* Fort McIntosh, Tex. (Laredo); WYI, *read* Langin Field, W. Va. (Moundsville); WYJ, *read* Chanute Field, Ill. (Rantoul); WYP, *read* France Field, Canal Zone (Cristobal); WYQ, *read* Luke Field, Hawaii (Pearl Harbor); WYR, read Kindley Field, P. I. (Corregidor); WYS, *read* Clark Field, Camp Stotsenburg, P. I.; WZL, *read* Camp S. D. Little, Ariz. (Nogales); WZM, *read* Camp Jones, Ariz. (Douglas); strike out all particulars following the call signals, NAU, NDE, NDJ, NENN, NGT, NIJN, NJY, NNZ, NRQ, NSD (regular station), NSM, NOGJ, NPE (Astoria, Oreg.), NSM, NUB, NUD, NUK, NUR, NUX, NXS, NXT, WUAB, WUAC, WUAD, WUAE, WYBR, WYBT, and WYBX.

SPECIAL LAND STATIONS, BY NAMES OF STATIONS.

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1922.]

ALTADENA, CALIF. (6XBF).—W. l., 150–375.
ATLANTA, GA. (4ZB).—W. l., 200, 275, 375.
AVALON, CALIF. (6XAD).—W. l., *200*, 220, 375.
BATTLE CREEK, MICH. (8YN).—W. l., 150–220.
BELMAR, N. J. (2XAO).—W. l., 1800–2600.
BLACKSBURG, VA. (3XN).—W. l., 225, 375.
BOSTON, MASS. (1YC).—W. l., 150–220; station operated and controlled by Eastern Radio Institute (Francis D. Pitts).
BUFFALO, N. Y. (8XAD).—W. l., 150–1000.
CHARLOTTE, N. C. (4XD).—W. l., 150–375.
CHERRYDALE, VA. (3XD).—W. l., 150–200.
CINCINNATI, OHIO (8XAH).—W. l., 200–1000.
CINCINNATI, OHIO (8XB).—W. l., 200–1000.
COLLEGEVILLE, MINN. (9XT).—W. l., 195, 220, 1277.
DALLAS, TEX. (5XBC).—W. l., 150–220.
DELANCO, N. J. (3XP).—W. l., 220–1000.
EL DORADO, KANS. (9XP).—W. l., 200–1000.
ENUMCLAW, WASH. (7YQ).—W. l., 150–220.
FRESNO, CALIF. (6XU).—W. l., 375, 425.
FULLERTON, CALIF. (6XAN).—W. l., 100–2000.
GROSSE POINT FARMS, MICH. (8XAS).—W. l., 100–300.
HANOVER, N. H. (1YB).—W. l., 150–220.
HYATTSVILLE, MD. (3XR).—W. l., variable under 1000.
LEXINGTON, KY. (9YC).—W. l., 150–220.
LEXINGTON, VA. (3YK).—W. l., 150–220.
LOS ANGELES, CALIF. (6XQ).—W. l., 150–1700.
LOS ANGELES, CALIF. (6XY).—W. l., 300–600.
MEDFORD HILLSIDE, MASS. (1XE).—W. l., 100–500.
MOUNT CLEMENS, MICH. (8XAE).—W. l., 100–300.
NEWARK, N. J. (2XAI).—W. l., 100–1800.
NEWARK, N. J. (2XAK).—W. l., 263.
NEWARK, N. J. (2XAR).—W. l., 360.
NEW YORK, N. Y. (2XK).—W. l., 220–1000.
NEW YORK, N. Y. (2XNB).—W. l., 200, 222.
NEW YORK, N. Y. (2XNA).—W. l., 150, 222, 1277, 1304.
NEW YORK, N. Y. (2XR).—W. l., 50–500.
NEW YORK, N. Y. (2XU).—W. l., 1091.
NEW YORK, N. Y. (2XY).—W. l., 300–600.
NEW YORK, N. Y. (2XZ).—W. l., 200–1000.
OAKLAND, CALIF. (6XA).—W. l., 100–360.
OAKLAND, CALIF. (6XW).—W. l., 150–1000; station operated and controlled by Richard C. Tavers and H. D. de la Montanya.
OSSINING, N. Y. (2XX).—W. l., 200–400.
PHILADELPHIA, PA. (3XC).—W. l., 400, 425.
PHILADELPHIA, PA. (3XV).—W. l., 200, 300.
PIEDMONT, CALIF. (6XAO).—W. l., 150–550.
PINE BLUFF, ARK. (5XAI).—W. l., 200, 220.
PITTSBURGH, PA. (8XK).—W. l., 100–1000.
PORT JEFFERSON, N. Y. (2XS).—W. l., 706–3000.
PORTLAND, OREG. (7XP).—W. l., 150–550.
PRINCETON, N. J. (3XM).—W. l., 200, 240.
ROCHESTER, N. Y. (8XQ).—W. l., 200–1600.
SAN ANTONIO, TEX. (5XY).—W. l., 220–1000.
SAN FRANCISCO, CALIF. (6XB).—W. l., 509.
SAN GABRIEL, CALIF. (6XS).—W. l., 150–1700.
SAN JOSE, CALIF. (6XE).—W. l., 700–900.
SAN JOSE, CALIF. (6XF).—W. l., 700–900.
SCHENECTADY, N. Y. (2XA).—W. l., 220–1000.
SEATTLE, WASH. (7XE).—W. l., 300–800.
SEATTLE, WASH. (7XK).—W. l., 150–1500.
SEATTLE, WASH. (7XS).—W. l., 150–1500.
SPRINGFIELD, MASS. (1XAE).—W. l., 50–2000.
STATE COLLEGE, N. MEX. (5XD).—W. l., 200–1000.

STOCKBRIDGE, MASS. (1XU).—W. l., 85–1500.
STOCKTON, CALIF. (6XAL).—W. l., 325–590.
TACOMA, WASH. (7XV).—W. l., 150–1500.
TAKOMA PARK, MD. (3XAJ).—W. l., 240.
TAMPA, FLA. (4XJ).—W. l., 220–1000.
URBANA, ILL. (9XZ).—W. l., 50–1000; address 1301 South Busey Avenue.
VALLEY STREAM, N. Y. (2XAQ).—W. l., 150–220.
WASHINGTON, D. C. (3XI).—W. l., 1277–1304.
WASHINGTON, D. C. (3XL).—W. l., 150, 200, 1200; station operated and controlled by Washington Radio Laboratories (Alfred Crossley).
WASHINGTON, D. C. (3XO).—W. l., 200, 210, 250.
WORCESTER, MASS. (1XZ).—W. l., 200–1000.
WORCESTER, MASS. (1YK).—W. l., 150–220.
YANKTON, S. DAK. (9YAK).—W. l., 150–220.

Strike out all particulars of the following-named stations: Cedar Grove, N. J. (2ZE); Cedar Rapids, Iowa (9YAS); Chicago, Ill. (9YE); Denver, Colo. (9YAL); Ellsworth, Me. (1XC); Galesburg, Ill. (9XW); Indianapolis, Ind. (9ZJ); Kansas City, Mo. (9XV); Mayville, N. Dak. (9YF); Montgomery, Ala. (5XR); New York, N. Y. (2XV); Pembina, N.Dak. (9YAF); Quincy, Ill. (9XQ); Richmond, Va. (3XAL); Washington, D. C. (3XAF) Washington, D. C. (3XAK); Washington, D. C. (3XZ); Washington, Pa. (8XG); and Wichita, Kans. (9XAE).

MISCELLANEOUS.

REGULATIONS GOVERNING GENERAL AND RESTRICTED AMATEUR RADIO STATIONS AND AMATEUR OPERATORS.

JUNE 28, 1923.

General and restricted amateur radio station licenses will be issued permitting the use of any type of transmitter (CW, spark, AC–CW, ICW, unfiltered CW, and phone), with the restriction that when using pure CW they are authorized to use wave lengths from 150 to 200 meters, and when using spark, AC–CW, ICW, unfiltered CW, and phone the wave lengths from 175 to 200 meters only can be used. The types of transmitters must be specified in the application and the license. Special amateur radio station licenses will be issued permitting the use of pure continuous wave transmitter only, authorizing the use of wave lengths from 150 to 220 meters.

For the purpose of application to amateur stations pure CW is defined, as follows: A system of telegraphing by continuous oscillations in which the power supply is substantially direct current as obtained from (1) a generator, (2) a battery, or (3) a rectifier with an adequate filter. (A filter is not deemed adequate if the supply modulation exceeds 5 per cent). General restricted and special amateur stations are not permitted to use a transformer input exceeding 1 kilowatt, or equivalent of this power based upon watt input to plates if tubes are used. (Where input rating of tube is not specified by manufacturer this rating will be considered as double the manufacturers output rating.)

On licenses issued for amateur stations you will include the following: "This station is not licensed to transmit between the hours of 8 and 10.30 p. m., local standard time, nor Sunday mornings during local church services." Special amateur stations must be operated by persons holding an extra first-grade amateur operator's license, or a commercial first-class operator's license, or a commercial extra first-class operator's license. Applicants must also meet the requirements of Regulations 53.

A new class of amateur operator's license is hereby established to be known as "Amateur extra first grade." Licenses of this grade will be issued to persons passing the required special examination with percentage of at least 75 and code speed in sending and receiving at least 20 words a minute, five characters to the word, who have had at least two years' experience as a licensed radio operator, and who have not been penalized for violation of the radio laws subsequent to the date of these regulations.

A. J. TYRER, *Acting Commissioner.*

Approved:
S. B. DAVIS, *Acting Secretary of Commerce.*

INFORMATION FROM THE BERNE BUREAU.

Ecuador.—The coast station at Puno, Guayas is now open to PG service. Other particulars of this station are as follows: Geographical location, 0.79° 53′ 00″ N., 2° 45′ 00″ S; call letters, HCP; range, 100 miles; system, c. w. telephone and telegraph; 8–11 a. m., 1–5 and 7–10 p. m., local time; rates, ship service 60 centimes per word, minimum 6 francs.

Great Britain.—General call signal BXZ has been assigned to all British war vessels. The coast station Guernsey has been dismantled. Station Portland Bill is reopened.

Cape Verde Islands.—The coast station Praia is open from 10 a. m.–1 p. m. and from 4 p. m.–7 p. m. (G. M. T.).

France.—The legal time is advanced 60 minutes in France from May 26 last to October 6.

Holland.—The legal time was advanced 60 minutes June 1, last.

ALASKAN STATIONS REOPENED FOR SUMMER SEASON.

Becharof (KUDV), opened May 28; Carlisle (KOV), opened May 31; Clarks Point (KHG), opened May 28; Daly (KDJT), opened June 2; Egegik (KMF), opened May 27; Ekuk (KMG), opened May 21; Koggiung (KVV), opened May 27; Libbyville (KMT), opened May 27; Metha Nelson (moored vessel) (KMP), opened June 18; Naknek (KMK), opened May 28; Nushagak (KKAE), opened May 30; Port Beauclaire (KWO), opened June 16; Pybus Bay (KFC), opened June 4; Snag Point (KHF), opened May 23; Tenakee (KOSC), opened May 25; Ugashik (KMU), opened June 1; and Warren (KDJU), opened May 25.

For the information of all concerned the following resolution is published:

[PUBLIC RESOLUTION—No. 48—67TH CONGRESS.]

[H. J. Res. 7.]

Joint Resolution To amend section 2 of the joint resolution entitled "Joint resolution to authorize the operation of Government-owned radio stations for the use of the general public, and for other purposes," approved June 5, 1920.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That section 2 of the joint resolution entitled "Joint resolution to authorize the operation of Government-owned radio stations for the use of the general public, and for other purposes," approved June 5, 1920, be, and the same is hereby, amended to read as follows:

SEC. 2. That the Secretary of the Navy is hereby authorized, under the terms and conditions and at rates prescribed by him, which rates shall be just and reasonable, and which, upon complaint, shall be subject to review and revision by the Interstate Commerce Commission, to use all radio stations and apparatus, wherever located, owned by the United States and under the control of the Navy Department—(a) for the reception and transmission of press messages offered by any newspaper published in the United States, its Territories or possessions, or published by citizens of the United States, in foreign countries, or by any press association of the United States, and—(b) for the reception and transmission of private commercial messages: *Provided*, That the rates fixed for the reception and transmission of all such messages, other than press messages between the Pacific coast of the United States, Hawaii, Alaska, and the Orient, shall not be less than the rates charged by privately owned and operated stations for like messages and service: *Provided further*, That the right to use such stations for any of the purposes named in this section, except for the reception and transmission of press messages, other than press messages between the Atlantic coast of the United States and ships at sea, shall terminate and cease as between any countries or localities or between any locality and privately operated ships, whenever privately owned and operated stations are capable of meeting the normal communication requirements between such countries or localities or between any locality and privately operated ships, and the Secretary of Commerce shall have notified the Secretary of the Navy thereof, and all rights conferred by this section shall terminate and cease on June 30, 1925, except that all such rights conferred by this section in the Republic of China shall terminate and cease on January 1, 1924.

Approved April 14, 1922.

TESTS OF RADIO RECEIVING SETS. (II).

The results of tests on receiving sets made by the radio laboratory of the Bureau of Standards are given in a series of letter circulars which are now being issued. The first letter circular of this series is Letter Circular No. 90, which gives results of tests on certain electron tube receiving sets. The second letter circular of the series is Letter Circular No. 93, which describes the results of tests on a number of receiving sets which utilize crystal detectors. It is believed that the methods followed and the examples given in these reports will be of assistance to manufacturers in the development of methods of testing and describing and improving their products. The particular receiving sets are referred to by arbitrary reference numbers rather than by a statement of the manufacturers' names and type and model numbers.

These letter circulars are available only in mimeographed form, but a limited number of copies are available for distribution to testing laboratories, manufacturers, and others who can show that they are directly concerned with the testing of receiving sets. Requests should be addressed to the Bureau of Standards, Washington, D. C.

COMPUTATIONS OF THE INDUCTANCE OF COILS FOR RADIO APPARATUS.

In electrical circuits the property of inductance plays a very important part. In the design of electrical apparatus it is very desirable that it shall be possible to calculate the inductance of the various types of coils which may be used. Inductance coils form an important part of every type of radio apparatus, whether used for transmitting, receiving, or measurement, and the recent rapid increase of popular interest in radio apparatus has made the calculation of the inductance of coils of even greater importance.

The calculation of the inductance of coils is, in general, a fairly difficult mathematical problem. Scientists have derived methods of calculating the inductance of certain particular kinds of coils. Even with the formula for a particular kind of coil available the actual computation of the inductance may be a tedious task unless tables are available from which the various quantities required in the computation may be readily taken. Several years ago Doctor Rosa and Doctor Grover, of the Bureau of Standards, collected in convenient form the available formulas for inductance calculations, added certain new formulas, and also added a number of tables of the various quantities required in computations, so that the time required for a given computation was greatly shortened. This paper was published as Bureau of Standards Scientific Paper No. 169, Formulas and Tables for the Calculation of Mutual and Self Inductance. A supplement to this paper, giving additional formulas and tables, including, among others, "pancake" or disk coils, was later published as Bureau of Standards Scientific Paper No. 320.

Recently there was issued Bureau of Standards Scientific Paper No. 455, Tables for the Calculation of the Inductance of Circular Coils of Rectangular Cross Section, which is concerned with several types of coils having more than one layer. Multiple-layer coils are particularly useful when a large inductance is required. For radio work it is important that the capacity of an inductance coil be small, and for this reason only certain types of multilayer coils are suitable for radio work. Among the types which have been used to secure small capacity are the "banked winding" and the "honeycomb" winding, which are here treated. Persons designing multilayer coils will find Scientific Paper No. 455 useful.

They are now finding frequent use in radio circuits, coils wound on forms such that each turn incloses a square, a hexagon, an octagon, or other regular polygon. Not only are such coils easy to construct, but it is necessary to support the wires of the coil only at the vertices of the polygon. This method of support brings only a very small amount of insulating material directly in contact with the wire and gives losses in the insulating material which are much smaller than the losses occurring in circular coils wound on insulating tubes. With the polygonal frame, the capacity can also be kept low. With coils wound on cylindrical tubes of insulating material every point of every turn of wire is in close contact with the tube, which fact often causes a considerable decrease in the selectivity and sensitivity of a receiving set in which the coil may be used. This decrease is, in part, due to the dielectric losses occurring in the insulating material composing the tube; for some kinds of insulating materials these losses may be considerable. Formulas have not heretofore been available for calculating the inductance of hexagonal and other polygonal coils having a greater number of sides.

There has recently been issued Bureau of Standards Scientific Paper No. 468, by F. W. Grover, Formulas and Tables for the Calculation of the Inductance of Coils of Polygonal Form, which derives formulas for the calculation from their dimensions of the inductance of single-layer coils of triangular, square, hexagonal, and octagonal form, and explains how calculations may be made for multilayer coils and for other polygonal forms, such as 12-sided polygons. Tables are also given which facilitate the computation of the inductance of such coils. The inductance of a long single-layer coil of polygonal cross section is substantially the same as the inductance of the single-layer coil of the same length and number of turns, having a circular cross section of the same area as the area of the polygon. On the other hand, the inductance of a single wire in the shape of a polygon is substantially the same as the inductance of a single circular turn having the same perimeter as the polygon, not the same area. The coils of short and medium lengths used in practice lie between the very long and the single-turn coils, and it is convenient to base the calculation of their inductance on the inductance of these equal-area and equal-perimeter circular coils, which are limits between which their inductance lies. The larger the number of sides of the polygon the more closely these limits approach each other. Formulas are already available for calculating the inductance of circular single-layer coils. For approximate calculations it is often sufficient to compute the two limiting inductances; the true inductance usually lies much nearer the lower than the upper limit.

All of these papers can be secured by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price of Scientific Paper No. 169 is 20 cents, and the price of the other papers is 10 cents each.

METHODS OF MEASURING THE PROPERTIES OF ELECTRICAL INSULATING MATERIALS.

A paper which has recently been issued by the Bureau of Standards gives a series of electrical, thermal, chemical, and mechanical test methods which have been found useful in the study of solid electrical insulating material.

The several tests described are those used in obtaining the data reported in Bureau of Standards Technologic Paper No. 216, entitled "Properties of Electrical Insulating Materials of the Laminated Phenol-Methylene Type." The several test methods described are radio-frequency phase difference or power loss, dielectric constant and flashover voltage, direct-current surface resistivity and volume resistivity, tensile strength, modulus of elasticity (tensile), proportional limit, modulus of rupture, modulus of elasticity (transverse), Brinell hardness, scleroscope hardness, resistance to impact, permanent distortion, density, moisture absorption, machining qualities, thermal expansivity, and the effects of heat, acid, and alkali.

The methods and apparatus are described to some detail, first, so that the data in Technologic Paper No. 216 will be definite and be capable of being correctly compared with other data; second, so that any of the tests may be reproduced by others.

This paper is Bureau of Standards Scientific Paper No. 471, Method of Measurement of Properties of Electrical Insulating Materials, by J. H. Dellinger and J. L. Preston, a copy of which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 15 cents.

CONTINUOUS WAVE RADIO TRANSMISSION ON A WAVE LENGTH OF 100 METERS, USING A SPECIAL TYPE OF ANTENNA.

A paper describing a method and apparatus for radio transmission on a wave length of 100 meters, which are the results of work at the Bureau of Standards, has recently been published in the Proceedings of the Institute of Radio Engineers. An electron-tube set which employed four 50-watt tubes was used. This was coupled to a special form of antenna rectangular in shape 18 feet high and 40 feet long. A special 100-meter receiving set is described which was developed in connection with transmission tests conducted with this antenna.

This method was successfully used for communication between Washington and Pittsburgh, and it was found that daylight communication was about as good as at night, and little fading occurred. Tests were made at Dayton, Ohio, in transmitting with this set from the ground to an airplane in flight, and directional characteristics of the antenna were determined.

A detailed account of these experiments is given in a paper entitled "Continuous Wave Radio Transmission on a Wave Length of 100 Meters, Using a Special Type of Antenna," by F. W. Dunmore, which appeared in the Proceedings of the Institute of Radio Engineers for June, 1923.

REDUCING THE GUESSWORK IN TUNING.

The recommendations of the Second National Radio Conference depend for success on the operation of radio broadcasting and other stations accurately on the frequencies to which they are assigned. The attainment of the necessary accuracy is made possible by improvements which the Bureau of Standards has made in recent months in the accuracy of its frequency measurements. The bureau now furnishes standards of frequency which permit the setting of transmitting stations on the exact number of kilocycles. The fundamental frequency basis has been established by four independent methods of primary standardization. The frequency standards are furnished through the transmission of standard frequency signals, the testing of wave meters, and the measurement by the bureau of frequency of various transmitting stations of which the frequency is known to be kept constant.

In the July (1923) issue of Radio Broadcast an article by Dr. J. H. Dellinger, chief of the radio laboratory of the bureau, entitled "Reducing the Guesswork in Tuning," gives a general statement of the methods employed in establishing the frequency standards and making them available to the public.

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